

THE OPEN UNIVERSITY OF SRI LANKA
DIPLOMA IN TECHNOLOGY – LEVEL 03
CONTINUOUS ASSESSMENT TEST II - 2012/2013
MPZ 3231 – ENGINEERING MATHEMATICS IA
DURATION: ONE AND QUARTER $\left(1\frac{1}{4}\right)$ HOURS



Registration No:.....

Date 03rd April 2013

Time 02:30– 03:45 p.m.

Instructions:

- Answer all the Questions
- Number of pages in the paper – 07.
- All symbols are in standard notation.

01. (a) Prove that a negative root of $x^3 - 4x + 9 = 0$ lies between -3 and -2 . (05 marks)

(b) Using the method of bisection find the value of x_3 where $x_0 = -3$ and $x_1 = -2$.
(05 marks)

02. Solve the equation $e^x \sin x - 1 = 0$, using Newton – Raphson method with convergence to 3 decimal places. Take $x_0 = 0$ (10 marks)

03. $5x_1 - 2x_2 + 3x_3 = -1$
 $-3x_1 + 9x_2 + x_3 = 2$
 $2x_1 - x_2 - 7x_3 = 3$

Using Jacobi's iterative method find the first two iterations.

Assume $x_1^{(0)} = x_2^{(0)} = x_3^{(0)} = 0$

(10 marks)

04. (a) Write down the Newton's forward difference interpolation formula. (05 marks)

(b) (i) Construct the forward difference table for the following statistics. (10 marks)

Year - x	1891	1901	1911	1921	1931
Population - y	46	66	81	93	101

(ii) Estimate the population in 1895 from the above statistics data. (10 marks)

05. (a) (i) Solve the following differential equation. (10 marks)

$$\frac{dy}{dx} = \frac{x+y}{3x}$$

(ii) Solve the following initial value problem (IVP) using integrating factor method.

$$ty' + 2y = t^2 - t + 1 \quad ; \quad y(1) = \frac{1}{2} \quad (15 \text{ marks})$$

(b) (i) Solve the following differential equations.

(10 marks)

$$\frac{d^3y}{dx^3} + 5 \frac{d^2y}{dx^2} + 6 \frac{dy}{dx} = 0$$

(ii) $\frac{d^2y}{dx^2} - 4026 \frac{dy}{dx} + 2013^2 y = 0$

(10 marks)

END

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